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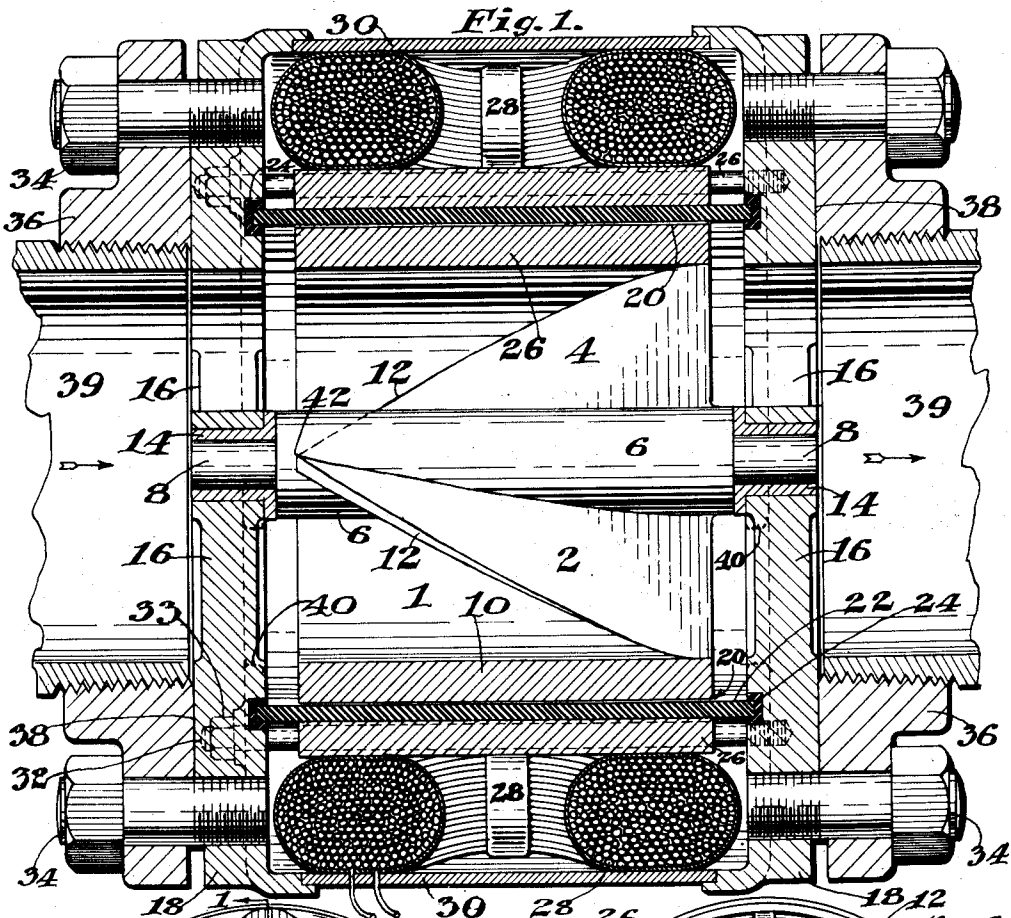
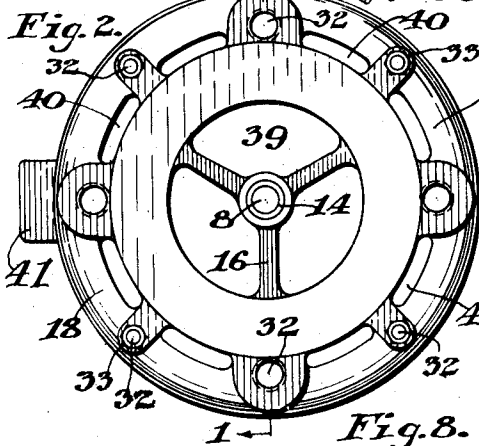
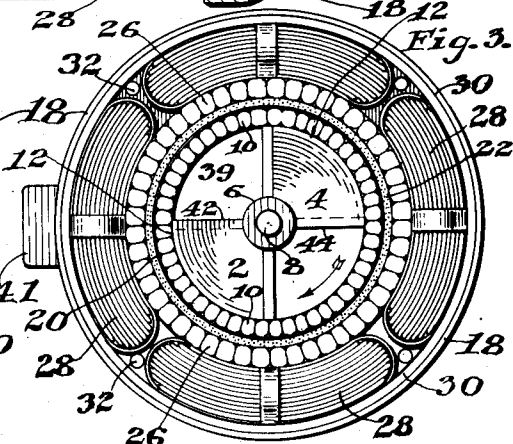
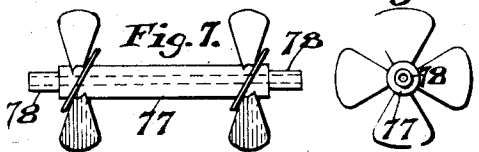
A. R. PEZZILLO

2,274,274

FLUID PUMP AND METERING DEVICE

Filed March 17, 1939

2 Sheets-Sheet 1



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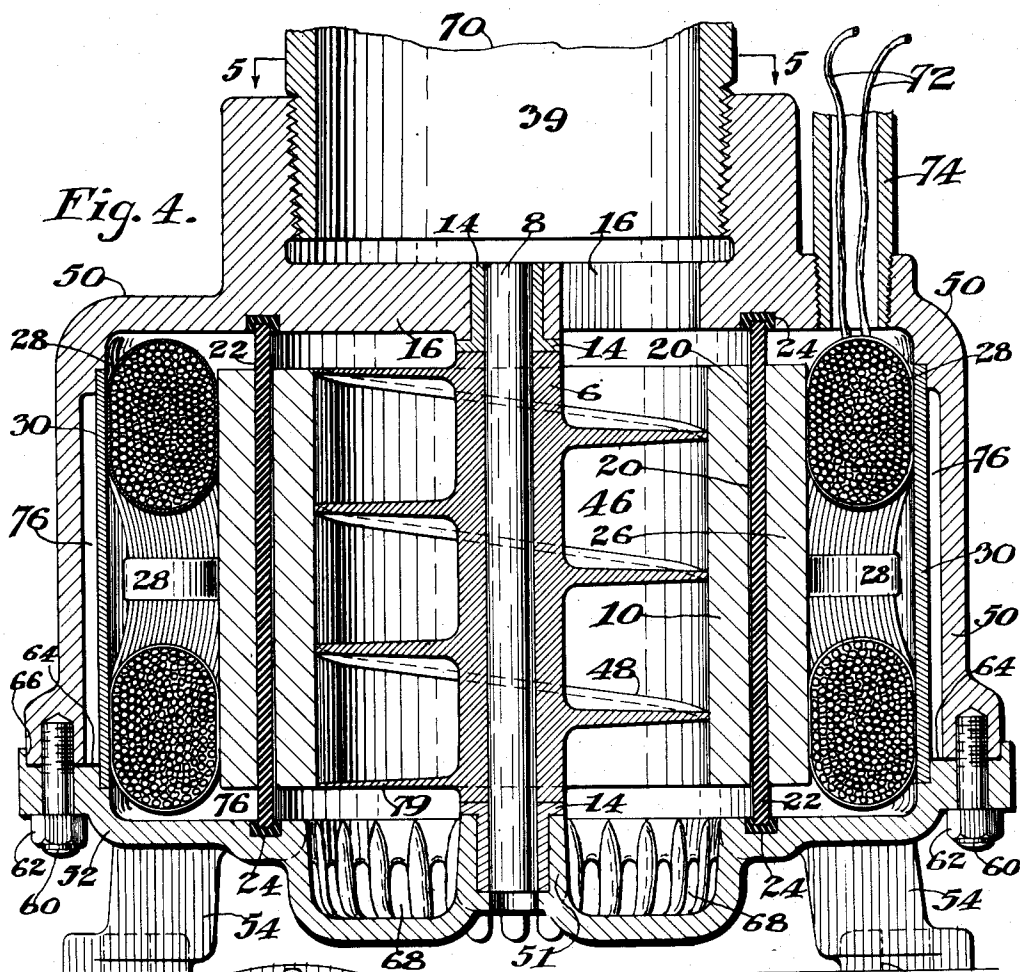
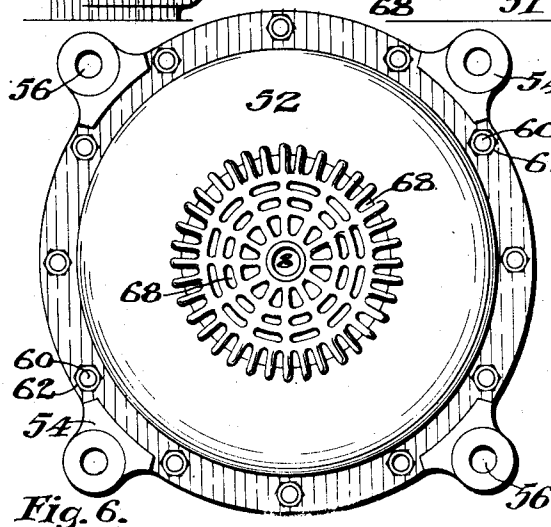
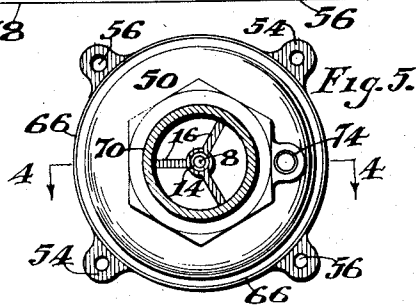
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FLUID PUMP AND METERING DEVICE

Filed March 17, 1939

2 Sheets-Sheet 2



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2,274,274

FLUID PUMP AND METERING DEVICE

Albert R. Pezillo, Philadelphia, Pa.

Application March 17, 1939, Serial No. 262,368

2 Claims. (Cl. 103—87)

My invention relates to a new and useful fluid pump and metering device, that is, one which can be used for propelling fluids whether they be gases or liquids through a pipe or other conduit, or which can, without any change in construction, be used for measuring or metering the fluid passing through said conduit.

My invention still further relates to a device of this character which can be partly or wholly submerged in a gas or liquid, and it relates further to a device of this character in which the fluid being impelled or metered is adapted to pass through the device as distinguished from ordinary pumps the impellers of which simply serve to propel a liquid from one side thereof to the other with or without building up pressure.

My invention further relates to a device of this character comprising a rotor and a stator in which the impelling element forms part of the rotor while the stator element, which is hermetically sealed and electrically and magnetically insulated from the rotor, is either inserted within a pipe or the like or forms part of the pipe or other conduit to which it is applied.

For the purpose of illustrating my invention, I have shown in the accompanying drawings, forms thereof which at the present are preferred by me, since they will give in practice satisfactory and reliable results, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement or organization of these instrumentalities as herein shown and desired.

In the accompanying drawings:

Fig. 1 represents a vertical section of a fluid pump and metering device embodying my invention the same being an enlarged view on line 1—1 of Fig. 2, certain parts being shown in elevation.

Fig. 2 represents a right hand end elevation of Fig. 1 with the companion flange removed.

Fig. 3 represents a right hand elevation of Fig. 1 with the companion flange and the motor cover removed.

Fig. 4 represents a vertical sectional view of a modified form of my invention, the same being an enlarged sectional view on line 4—4 of Fig. 5.

Fig. 5 represents a top plan view of Fig. 4, this view being taken along line 5—5 of Fig. 4.

Fig. 6 represents a bottom plan view of Figs. 4 or 5.

Fig. 7 represents a side elevation of a hollow

shaft propeller which may be used in either form of construction.

Fig. 8 represents an end elevation of Fig. 7.

Referring to the drawings in which like reference characters indicate like parts, and more particularly to Fig. 1 my novel pump and metering device comprises an impeller 1 formed of the blades 2 and 4 which are mounted upon or are formed integral with the hub or sleeve 6 on the shaft 8 running through or made integral with the hub member 6. 10 designates the motor rotor which is fastened to or cast integral with the blades 2 and 4 along their edges 12. In this manner the propeller and the rotor are dynamically balanced on the shaft 8, which is journaled in bearings 14 which are held in perfect concentric alignment by the spiders 16 forming part of the motor covers 18. A slight gap 20 is maintained between the rotor 10 and the non-magnetic and electrically, non-conducting stationary cylinder 22. The cylinder 22 is invested at both ends in rubber gasketed seats 24 which are formed on the inside of the motor covers 18. Mounted about the cylinder 22 is the motor stator which comprises the usual segments 26, the motor windings 28 and clamping band or housing 30. The covers 18 are bolted together against the cylinder 22 and the surrounding stator by the bolts 32 and nuts 33. The covers 18 carry studs and nuts 34 which hold the flanges 36 in a liquid-tight manner against the covers 18 along the joints 38. The flanges 36 carry the pipe line sections 39. As will be seen from Fig. 1, except for the space taken up by the blades 2 and 4 of the impeller, the internal area of the rotor is the same as the internal area or capacity of the pipe lines 39. In order to cool the motor windings 28 I have provided the air vents 40 best seen in Fig. 2, and the motor stator is provided with the usual thermal overload cut-out 41 which is suitably secured to the motor housing 30. While I have shown the leading edges 42 and 44 of the blades 2 and 4 at an angle of 180° from each other (see Fig. 3), I may use any type or shape of impeller now or in the future available, which, by rotation will propel fluids through the rotor from one of the pipes 39 into the other.

From the foregoing it will be seen that my novel pump and metering device becomes part of the pipe line in connection with which it is to be used, the overall diameter of my device being in some instances only slightly larger than the overall diameter of the line itself. The value

of this feature can best be realized when it is remembered that if a conventional pump were used it would have to be placed at right angles to the line and the impeller shaft would have to run through a stuffing box in a T-shaped housing applied to the line. This conventional structure is clumsy and difficult to keep packed and running efficiently and quietly. With my novel arrangement the pump conforms to the contour of the pipe line and the inefficient conventional impeller and stuffing box are eliminated.

In Fig. 4 I have shown my novel device as adapted for use as a sump pump and in this modification I use the propeller 46 in place of the propeller 1 shown in Fig. 1, and by reference to Fig. 4 it will be seen that the propeller 46 is of a helical or spiral form having one continuous screw blade 48 carried by the hub 6 or integral therewith, and, like the propeller 1 in Fig. 1, the propeller 46 is mounted on the shaft 8 which is supported in the bushings or bearings 14. The bushing 14 near the top end of the shaft 8 (as viewed in Fig. 4) is held concentric by the spider 16 carried by or forming part of the housing 50 and the bushing 14 supporting the lower end of the shaft 8 (as viewed in Fig. 4) is supported in a hub or bearing 51 formed in the cover 52. The cover 52 is supported by the legs 54 which are provided with bolt holes 56 for the purpose of securing the housing in position. The cover 52 is also provided with studs 60 which are engaged by the nuts 62 to clamp the cover 52 in fluid-tight position against the gasket 64. The stud 60 and nut 62 also serve to clamp the cover 52 against the insulating cylinder 22 and the housing 50 which encloses the stator of the construction illustrated in Fig. 4. By means of the dowel arrangement 66 the housing 50 is held in proper concentric position with respect to the cover 52 and hence the shaft 8 is properly aligned and this results in adequate alignment and concentricity of the rotor 10 with respect to the insulating cylinder 22 and also insures the uniform gap 20 between the rotor 10 and the cylinder 22. A portion of the cover 52 registering with the internal diameter of the rotor is either formed as, or provided with, a screen effect 68 to prevent suction into the rotor of objects too big to be safely propelled therethrough. In connection with the submerged type of pump, such as is illustrated in Fig. 4, I provide the lead wires 72 which are enclosed in a fluid-tight pipe 74 extending to the source of power. Also, the pipe 74 may enclose other wires (not shown) extending to the cut-out 41 in the event that such wires cannot be conveniently disposed in the fluid-tight space 76.

While I have thus far described my invention as relating to a pump, I wish to point out that my invention can be used equally well, and without any change, as a metering device since I can, by disconnecting the wires 72 from the source of power and by connecting the windings to an ammeter, transform the motor into a generator, and, by forcing fluid through the rotor to turn the impeller 1 or 46, I can generate current which, when measured on the ammeter and suitably calibrated, will indicate the volume of rate of flow through the rotor.

Similarly, if it is desired to use my construction for mixing various fluids such, for instance, as air and fuel oil, I can use the hollow shaft 77 (shown in Fig. 7) in place of the shaft 8 (shown in Figs. 1 and 4), and through the hollow shaft 6 I can pass a tube 78 through which a fuel oil

can be ejected into the pipe line 38 in Fig. 4 while the air is admitted through the screen 68. In this construction I can use any desired form of impeller, either as shown in Figs. 1 and 4 or as shown in Figs. 7 and 8. If it is desired to mix a plurality of fluids, whether they be gases or liquids or a mixture of both, the desired number of conduits can be positioned at the inlet end of the impeller of the rotor and the mixture will be delivered at the outlet end thereof.

The operation is as follows:

To use my novel device of the semi-submerged type shown in Figs. 1, 2 and 3, the current is turned on the motor in the conventional manner and the torque impetus given to the rotor by the stator assembly, turns the rotor clockwise as shown in Fig. 3 by the arrow. The blades 2 and 4 of the rotor 1 are so designed that the cutting edges 42 and 44 engage the liquid coming from the left or upstream side of the pump and propels it through the rotor and forces the liquid out of the right hand end of the pump as shown by the two arrows in Fig. 1.

To use my fully submerged type shown in Figs. 4, 5 and 6, the current is turned on the motor in the conventional manner, the rotor 46 in this structure is so designed that it must turn counter-clockwise and the lower cutting edge 70 of the helical or spiral propeller blade 48 will pick up the liquid, gas or air coming through the screen apertures 68 and move same through the length of the propeller 46 into the outlet pipe 70.

It will be seen that my novel electric pump has few parts, all of them are of simple construction and of great durability, with none of the complications which arise over a period of long use. The rotor is easily balanced dynamically and it can be maintained in its concentric position without costly manufacturing processes, which insures that the gap 20 will be maintained accurately throughout.

With the above described reversal of action, the pump now becomes a generator which with a suitable ammeter is metamorphosed into a flow meter. This reversed action will make it possible to produce a very cheap and reliable metering device which would replace many of the costly and unsatisfactory orifice metering valves now on the market. There is no lubrication necessary, no annoying stuffing boxes to be repacked at inconvenient intervals and no mechanical moving parts that have to be serviced, which would entail the breaking of pipe joints and interrupting the service for which the installation was made.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a device of the character stated, a sectional housing having end sections one of which forms an inlet and the other an outlet and having an outer casing clamped between said end members, the latter having annular grooves on their inner faces, preformed sealing means in said grooves, a non-magnetic open ended cylinder contributing with said housing to form stator and rotor chambers, means to secure said end members to said casing and thereby press the open ends of said cylinder against said sealing means, a stator in the stator casing, and a rotor within the stator and having a bladed shaft journaled in said end members.

2. In a device of the character stated, a sectional housing having end sections one of which forms an inlet and the other an outlet and hav-

ing an outer casing clamped between said end members, the latter having annular grooves on their inner faces, sealing means in said grooves, a non-magnetic cylinder contributing with said housing to form stator and rotor chambers, means to secure said end members to said casing and thereby press the ends of said cylinder

against said sealing means, a stator in the stator casing, and a rotor having an impeller within the stator and having a shaft journaled in said end members, said shaft being tubular for passage of a fluid different from that of the fluid circulated by the blades.

ALBERT R. PEZZILLO.